PATENT SPECIFICATION

Application Date: Feb. 3, 1921. No. 4106/21.

179,312

Complete Left: Nov. 3, 1921.

Complete Accepted: May 3, 1922.

PROVISIONAL SPECIFICATION.

Improvements in or relating to Machines for Making Pneumatic Tyre Covers or Casings.

We, THE DUNLOP RUBBER COMPANY, LIMITED, a British company, of Dunlop House, 1, Albany Street, Regent's Park, in the County of London, and COLIN MACBETH, Experimental Engineer, of the

variable as desired relatively to the peripheral speed of that portion of the casing plies with which the said disc makes contact. The spinning down disc and the driving disc may revolve on a common ... separate axes and can be either

ERRATA.

SPECIFICATION No. 179,312.

Page 3, line 43, *for* "disc" *read* "discs"
,, 4, ,, 72, *for* "disc" *read* "discs"
,, 6, ,, 26, *for* "bed" *read* "bead"

PATENT OFFICE,
August 3rd, 1922.

discs are dependent amongst other factors

... disc in order that the latter having a

Memo. to Librarians.

SPECIFICATION No. 179312.

The accompanying Pages 9 and 10 of this Specification are sent in place of those previously printed, which are now cancelled. Please substitute.

THE PATENT OFFICE,
14*th August*, 1922.

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PROVISIONAL SPECIFICATION.

Improvements in or relating to Machines for Making Pneumatic Tyre Covers or Casings.

We, THE DUNLOP RUBBER COMPANY, LIMITED, a British company, of Dunlop House, 1, Albany Street, Regent's Park, in the County of London, and COLIN MACBETH, Experimental Engineer, of the aforesaid company's works at Fort Dunlop, Erdington, Birmingham, in the County of Warwick, a subject of the King of Great Britain, do hereby declare the nature of this invention to be as follows:—

This invention relates to machines for making pneumatic tyre covers or casings (which machines are generally known as casemaking machines) and has particular reference to such machines of the kind in which the casing plies are laid or rolled down on the sides of the core by means of spinning down discs or the like which are moved inwardly towards the centre of the core during the rotation of the core. The results obtained by the spinning down discs are dependent amongst other factors on the angle at which the discs move in relation to the contour of the core and it is customary to control the angularity of the discs either by hand or by suitable cam arrangements, the latter having to be changed for each size of tyre casing to be built up.

According to this invention means are provided whereby the core or casing contour serves as a cam which directly controls the angularity of the spinning down discs during the forward or inward stroke of the latter. Means are also provided whereby each spinning down disc is driven by an additional or driving disc in direct contact with the casing plies on the rotating core. Further, means are provided for enabling each spinning down disc to be rotated at a peripheral speed which is variable as desired relatively to the peripheral speed of that portion of the casing plies with which the said disc makes contact. The spinning down disc and the driving disc may revolve on a common axis or on separate axes and can be either rigidly connected or geared together so that they have a fixed velocity ratio; alternatively the driving disc may drive the spinning down disc through suitable friction means so that the velocity ratio may vary in such manner that the outer or driving disc (which has a good grip on the casing) efficiently controls the speed of the inner or spinning down disc. One of the main features of this invention is to impart the necessary drive or forward " wipe " to the spinning down disc without causing undue and harmful slippage which on large section casings would be injurious. In some cases the spinning down disc may be of substantially larger diameter than the driving disc in order that the latter having a good grip on the casing will tend to drive the spinning down disc at a higher speed than that of the surface with which the spinning down disc contacts. The driving of the spinning down disc at a higher speed than the core and the ply or plies thereon counteracts any tendency for the plies to fold back or lag and take up an unnatural angle on the core so that more accurate laying of the plies is ensured. If however the spinning down or inner disc is only driven at the same surface speed as casing with which it contacts, it is found that due to the fact of the outer disc driving the inner one, and the outer one having a firm foundation with which to contact, the lag is reduced because the inside roll is only required to attach the

[Price 1/-]

ply and does not have to be driven by contact with an unattached ply which tends to an irregular attachment and drag.

Means may be provided for varying the angle between the spinning down disc and the casing so that the most desirable angular position for the disc can be readily obtained to suit any size of casing. Further, means may be provided whereby the distance between the driving disc and the spinning down disc may be varied so that the means may be rendered suitable for dealing with large variations in sizes of casings. In describing several examples of the invention only the means provided at one side of the core will be referred to, it being understood that these means are duplicated and placed one on each side of the rotating core. In one example of the invention, the spinning down disc is connected to or forms part of one end of a shaft whose other end loosely carries another and larger disc which is held between friction plates secured on the shaft. The shaft is supported in a yoke by ball bearings or the like, which yoke is supported in a forked lever pivoted on a reciprocatory slide adapted to impart the required radial movement to the spinning down discs and the driving discs at the two sides of the core. The yoke may swivel on a vertical or inclined axis so that during the forward or inward stroke, the two discs are angularly moved on the said axis by reason of the contour of the core or casing surface against which they are held in contact by suitable pressure means such as described in the specification of our concurrent patent application. During the inward stroke, the driving or spinning down discs remain in parallel planes notwithstanding the change in angularity relatively to the core. A compressed air jet may be provided for impinging on the loose ply in advance of the spinning down disc to prevent this portion of the ply folding back and creasing and in the present example the compressed air may be supplied through a passage in the aforesaid yoke communicating with a passage terminating at the centre of the spinning down disc so that the jet of air issues from the centre of the spinning down disc and is directed onto the loose portion of the ply.

In a somewhat similar construction the spinning down disc is rigidly connected to the outer or driving disc by a sleeve adapted to rotate on ball bearings around a shaft which is fixed in a U-shaped bracket capable of swivelling on a vertical axis in the aforesaid forked lever which is pivotally connected to the reciprocating slide. In some cases preferably for rolling the ply or plies over a clincher type of bead the inner or spinning down disc is of substantially larger diameter than the outer or driving disc so that the former is presented to the bead at a more acute angle than is the case when a spinning down disc is of less diameter than the driving disc. In order to prevent slippage at the point of contact between the large diameter spinning down disc and the ply as might occur if the two discs were frictionally connected as above described, it is preferred to positively gear the two discs together so that they have a fixed velocity ratio. In such an example the two discs are rotatably mounted preferably on ball bearings or the like on an eccentric shaft (that is a shaft having two portions which are not in alignment) which is rigidly fixed in a U-shaped bracket capable of swivelling on a vertical axis in a forked lever as aforesaid. The rear or driving disc may be formed with a boss having a toothed periphery or carrying a pinion which meshes with an internal toothed ring on a boss forming part of or secured to the inner or spinning down disc. The gear ratio is so arranged that whilst the diameters of the discs are such as to cause the spinning disc to be presented to the bead at the most favourable angle, this disc is prevented from slipping relatively to the ply at the point of contact. If desired, the driving disc may be provided with frictional gripping means as described above. The bearing portions of the aforesaid eccentric shaft may be parallel or inclined to suit the relative angle required by each disc but they are not variable relatively to each other. Instead of employing a one piece eccentric shaft the bearing portions for the two discs may be separate and suitably supported in a swivelling frame. Compressed air may be supplied through a passage in the eccentric shaft to a nozzle directed inwardly towards the side of the core in advance of the spinning down disc. This modification is capable of several variations as regards the details of construction particularly when provided with means for varying the angularity of the discs relatively to the core, and for varying the distance between the two discs as hereinafter referred to.

In another example the two discs may be mounted on two shafts having intersecting axes, which shafts are supported in a swivelling bracket mounted in a

forked lever carried by the slide as aforesaid. The two discs are consequently arranged at an angle to each other and their shafts may be geared together by bevel pinions having the desired ratio. In a similar example the discs are formed with bosses which rotate on ball bearings surrounding the two shafts having intersecting axes which extend from a vertical rod adapted to swivel in the forked lever as aforesaid. In this example, compressed air passes through a passage in the shaft to the inner or spinning down disc and an inwardly directed jet tube or nozzle is secured in this passage so that the issuing air may impinge on the loose portion of the ply. Any suitable means, however, for causing the air to impinge on the ply may be provided in connection with any of the foregoing examples, for instance, in some cases a separate pipe may be hinged on a vertical axis on which the swivelling of the two discs is effected due to the contour of the core, which pipe may be bent round outside the spinning down disc with its nozzle suitably inclined to direct the air on to the lose portion of the ply.

In an example of the means for varying the angle between the spinning down disc and the casing as applied for instance to the modification in which the two discs are mounted eccentrically on one eccentric shaft or two separate shafts, suitable means are provided whereby the said shaft or shafts may be angularly adjustable in and relatively to the supports carrying the same; various means for mounting the parts and effecting the adjustment may be employed, but the aforesaid adjustment results in the horizontal or lateral distance between the axes of the disc being reduced and provided the discs be maintained in contact with the core during this adjustment, the angular position of the discs relatively to the core is varied as required according to the extent of angular adjustment of the eccentric shaft or shafts. The distance between the two discs may be varied as required by suitable means which move the driving disc axially relatively to the spinning down disc and in some cases the gearing between the two discs may be such as to permit of the relative longitudinal or axial displacement between the two discs although the construction may be such that the adjustment may be effected without relative displacement between the gear wheels. Suitable locking means are provided to secure the discs in the positions to which they are adjusted. During the angular adjustment of the eccentric shaft the vertical distance between the axes of the two discs is slightly altered. Generally speaking however this alteration in the vertical distance between the two axes would not be a disadvantage, but it is possible to reduce the vertical distance between the two axes, by suitably tilting the eccentric shaft or shafts. This tilting movement may be effected by mounting the whole spinning down-gear on the reciprocating slide in such manner that it can be angularly adjusted relatively to the slide and clamped in any desired position. As stated above various means may be provided for enabling the discs to be angularly adjusted relatively to the casing and for enabling the distance between the discs to be changed as required, and although reference has been made to such adjusting means in connection with only one of the aforesaid modifications, it will be understood that suitable means may be provided in connection with any of the examples for enabling the discs to be set in the most favourable angular and other positions relatively to the core to suit different types or sizes of casings to be built up.

Dated this 3rd day of February, 1921.

HASELTINE, LAKE & Co.,
28, Southampton Buildings, London, England, and
Park Row Building, 15, Park Row, New York, N.Y., U.S.A.,
Agents for the Applicants.

COMPLETE SPECIFICATION.

Improvements in or relating to Machines for Making Pneumatic Tyre Covers or Casings.

We, The Dunlop Rubber Company, Limited, a British company, of Dunlop House, 1, Albany Street, Regent's Park, in the County of London, and Colin Macbeth, a subject of the King of Great Britain, of the aforesaid company's works at Fort Dunlop, Erdington, Birmingham, in the County of Warwick, do

hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to machines for making pneumatic tyre covers or casings (which machines are generally known as case making machines) and has particular reference to such machines of the kind in which the casing plies are laid or rolled down on the sides of the core by means of spinning down discs or the like which are moved inwardly towards the core centre during the rotation of the core. The results obtained by the spinning down discs are dependent amongst other factors on the angle at which the discs move in relation to the contour of the core and it is customary to control the angularity of the discs either by hand or by suitable cam arrangements, the latter having to be changed for each size of tyre casing to be built up.

According to this invention means are provided whereby the core or casing contour directly controls the angularity of the spinning down discs during the inward or operative stroke of the latter. For this purpose each spinning down disc may be supported in such manner as to be capable of swivelling movement and it is provided or associated with a member in contact with the core or the casing plies thereon so that a two-point contact is obtained which enables the spinning down disc to swivel and thus change its angular position relatively to the contour of the core. The said member by means of which a two-point contact with the core is obtained, may be in the form of an additional disc which may serve by reason of its contact with the rotating core or the ply thereon to drive or rotate the spinning down disc, and various means may be provided whereby the additional or driving disc rotates the spinning down disc at any required peripheral speed relatively to the peripheral speed of that portion of the casing ply with which the said disc makes contact. Each spinning down disc and its additional or driving disc may revolve on a common axis or on separate axes and can be either rigidly connected or geared together so that they have a fixed velocity ratio; alternatively the driving disc may drive the spinning down disc through suitable friction means so that the velocity ratio may vary in such manner that the outer or driving disc (which has a good grip on the core and the casing ply) efficiently controls the speed of the spinning down disc. In some cases the spinning down disc may be of substantially larger diameter than the driving disc in order that the latter, having a good grip on the casing will tend to drive the spinning down disc at a higher speed than that of the surface with which the spinning down disc contacts so that a "forward wipe" is imparted by the spinning down disc without causing undue and harmful slipping which on large casings would be injurious. The driving of the spinning down disc at a higher surface speed than the core by making the spinning down disc of larger diameter than the driving disc or by the gear drive hereinbefore referred to, counteracts any tendency for the plies to fold back or lag and take up an unnatural angle on the core, so that more accurate laying of the plies is ensured. If however the spinning down disc is only driven at the same surface speed as the core, it is found that, owing to the driving disc having a firm foundation with which to contact, the lag is reduced because the spinning down disc is only required to attach the ply and does not have to be driven by contact with an unattached ply which tends to an irregular attachment and drag.

Means may be provided for readily adjusting the spinning down discs so that they can be initially presented to the casing at the most desirable angle, for example by varying the distance between the axes of the driving disc and the spinning down disc, or by varying the distance between the planes of these two discs. Thus the improved mechanism may be rendered suitable for dealing with different types and sizes of casings: further the discs may be adjusted to ensure correct distribution of pressure or load thereon at different points on the core contour.

If desired means may be provided for causing a jet of air to impinge on the portion of the ply radially in advance of the spinning down disc for the purpose of preventing this portion of the ply from folding back or being creased during the spinning or rolling down stroke. Alternatively, a metal shield or wiper plate may be associated with the spinning down disc in such manner that it engages with the ply and prevents the latter from being folded back or creased.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawings, in which:—

Figures 1 and 2 are respectively a sec-

tional elevation and a plan view showing one construction of the improved spinning down mechanism located at one side of the tyre core.

Figures 3 and 4 are enlarged sectional detail views hereinafter referred to.

Figures 5 and 6 are respectively a side elevation and a plan of a modified construction of the improved spinning down mechanism.

Figure 7 is a plan view of a further modification.

Figure 8 is a sectional plan view of a modification similar to that illustrated in Figure 7.

Figures 9 and 10 are respectively a side elevation and a sectional plan of a still further modification.

Figure 11 is a sectional plan of a modification similar to that shown in Figures 9 and 10.

Figure 12 is a detail view hereinafter referred to.

Figures 13, 14 and 15 are sectional plan views of further modifications.

Figures 16, 17 and 18 are diagrams hereinafter referred to.

Figure 19 is a front view of one of the spinning down discs with which is associated the aforesaid metal shield or wiper plate.

Figure 20 is a diagrammatic perspective view showing the metal shield or wiper plate mounted on a swivelling yoke or frame which carries the spinning down disc and the driving disc.

The examples illustrated in the drawings show the spinning down mechanism at only one side of the core; it will be understood however, that the various examples shown in the accompanying drawings are duplicated and placed one on each side of the rotating core. Throughout the aforesaid drawings, Z represents the rotatable tyre core on which the casing is built up and in certain of the figures, Z^1 represents the casing or casing plies placed around the core. A represents the inner or spinning down disc and B represents the controlling or driving disc.

In the example shown in Figure 1, the spinning down disc A is connected to or forms part of one end of a shaft A^x whose other end loosely carries a bush B^x on which the disc B is rigidly secured. The disc B is clamped between the friction plates B^1 and B^2 by means of a spring washer B^3 and lock nuts B^4, which latter secure the friction plate B^2 on the outer end of the shaft A^x; the said shaft A^x is supported in a yoke C by ball bearings or the like, which yoke is mounted to swivel on pins C^1 in a forked arm or lever C^2 pivoted at C^3 (see Figure 2) on a reciprocatory slide adapted to impart the required radial movement to the spinning down discs A and the driving discs B at the two sides of the core; the discs A and B are adapted to be maintained in contact with the core Z or the casing plies Z^1 thereon, by any suitable pressure means. Owing to the two discs A and B being pressed against the sides of the core, the yoke C swivels on the pins C^1 during the forward or operative stroke so that the two discs are angularly moved on the axis of movement of the said yoke by reason of their engagement with the core Z (or the casing plies Z^1) which therefore serves as a cam to control the angular movement of the said discs A and B during the spinning down stroke. It will be understood that the driving disc B is rotated by reason of its contact with the rotating core and therefore imparts rotation to the spinning down disc A through the friction plates B^2 and B^3 and the shaft A^x; by means of this friction drive it is possible to impart the necessary drive and forward wipe to the spinning down disc A without causing excessive and harmful slippage which on large casings would be injurious. An air jet may be provided for impinging on the loose portion of the casing ply in advance of the spinning down disc to prevent this portion of the ply folding back and creasing and in the example shown in Figure 1, the air may be supplied from a suitable source through a passage D in the aforesaid yoke communicating with a passage D^1 in the shaft A^x which passage D^1 terminates at the centre of the spinning down disc so that the jet of air issues from the said centre and is directed on to the loose portion of the ply during the inward or operative stroke. The passages D and D^1 are shown more clearly in the enlarged sectional view shown in Figure 3 and the sectional plan view shown in Figure 4, the latter sectional view being taken on the line 4—4 of Figure 3.

In the example shown in Figures 5 and 6 the spinning down disc A and the driving disc B are rigidly connected, for example by an integral sleeve A^2 which is adapted to rotate on ball bearings or the like around a shaft A^x which is fixed in a U-shaped bracket or yoke C capable of swivelling on pins C^1 carried by a forked lever C^2 pivotally mounted at C^3 on a reciprocatory slide as hereinbefore described in connection with the example shown in Figures 1 and 2. In this example the shaft A^x does not rotate but

merely serves as a support for the rigidly connected discs A and B which, as aforesaid, are maintained in contact with the core so that the contour of the latter causes the discs A and B to move with the swivelling yoke C; thus the angularity of the discs relatively to the core is automatically changed during the spinning down stroke. In this example, an air passage D leading from the upper pin C^1 extends through the yoke C and communicates with a passage D^1 in the shaft A^x, which passage D^1 terminates at the centre of the spinning down disc A so that air may issue from the said passage D^1 and impinge on the loose portion of the ply in advance of the spinning down disc.

The example illustrated in Figure 7 is a modification of the construction shown in Figures 1 and 2 and in this example the spinning down disc A is of larger diameter than the driving disc B and owing to the larger diameter of the spinning down disc the latter is caused to be presented to the bed at a more acute angle than in the example hereinbefore described. Also the smaller driving disc B tends to drive the spinning down disc A at a higher speed than that of the surface with which the disc A makes contact. In order to prevent slippage at the point of contact between the large diameter spinning down disc and the ply as may occur if the two discs were frictionally connected as described in connection with the example illustrated in Figures 1 and 2, it is preferred to positively gear the two discs A and B together so that they have a fixed velocity ratio. Figure 8 illustrates an example in which the two discs A and B are positively geared together; the two discs A and B are rotatably mounted preferably on ball bearings or the like on an eccentric shaft (that is a shaft having two portions A^x, B^x which are not in axial alignment), the said eccentric shaft in the example shown being rigidly fixed in a U-shaped bracket or yoke C capable of swivelling in a forked lever C^2, as described in connection with the example shown in Figures 5 and 6. The disc B is formed or provided with a toothed boss or pinion B^5 in mesh with an internal toothed ring A^1 formed on a boss A^2 extending rearwardly from the spinning down disc. The gear ratio is so arranged that whilst the diameters of the discs B and C are such as to cause the spinning down disc to be presented to the bead at the most favourable angle, the spinning down disc is prevented from slipping relatively to the ply at the point of contact. The portions A^x and B^x of the aforesaid eccentric shaft may be parallel or inclined to suit the relative angle required by each disc. Instead of employing a one piece eccentric shaft, the bearing portions A^x B^x may be separate and suitably supported in the swivelling frame or yoke C. Air may be supplied through a pipe D and a passage D^1 in the eccentric shaft terminating in a nozzle directed inwardly towards the loose portion of the ply indicated by the dotted lines Z^1 in Figure 8 in advance of the spinning down disc.

The example illustrated in Figures 9 and 10 possesses the same advantages as the construction shown in Figure 8. In this example, however, the spinning down disc A and the driving disc B are mounted on shafts A^x B^x having intersecting axes, which shafts are supported in a frame or yoke C adapted to swivel on pins C^1 in a forked lever C^2 as hereinbefore described. The shafts B^x and A^x are geared together by bevel pinions B^5 and A^1 having the desired ratio. Figure 11 illustrates a similar modification to that shown in Figures 9 and 10 wherein the bevel pinions B^5 and A^1 are formed at the ends of bosses on the discs A and B rotatably mounted on the inclined shafts A^x B^x which extend from a vertical rod C, see Figure 12, adapted to swivel in a forked lever C^2 for enabling the angularity of the discs to be changed during the operative stroke. Air may be passed through a passage D in the rod C to a passage D^1 in the shaft A^x connected to an inwardly directed nozzle or jet tube D^2 so that the issuing air impinges on the loose portion of the ply Z^1 in advance of the spinning down disc as indicated in Figure 11.

Figures 13, 14 and 15 show examples which are generally similar to that shown in Figure 8 but they are provided with means for initially adjusting or setting the angle of the spinning down disc so that the latter may be presented to the casing plies on the core at the most favourable angle, thus rendering the spinning down mechanism suitable for dealing with large variations in sizes of casings. Before describing these modifications in detail the one method of adjusting the discs will be described with reference to the modification shown in Figure 8 and the diagrams shown in Figures 16, 17 and 18; considering the construction shown in Figure 8, it will be understood that if the eccentric shaft A^x B^x be angularly moved in relation to its bearing or

yoke C the positions of the discs A and B would be altered in relation to the casing Z^1. This will be better understood by reference to the diagrams illustrated in Figures 16, 17 and 18. In Figure 16 which is an end view looking towards the centres of the discs, the horizontal distance between the centres of the discs is indicated by X and the vertical distance between the said centres by Y. By angularly moving the eccentric shaft A^x B^x (see Figure 8) in its yoke or bearing C in a clockwise direction, the relative positions of the discs is changed, so that as shown in Figure 17, the horizontal distance between the disc centres is substantially reduced as indicated by X^1 and the vertical distance between the said centres increased as indicated by Y^1. By reason of the contact of the discs A and B with the casing Z^1 and the swivelling yoke C (see Figure 8), the aforesaid angular adjustment of the eccentric shaft A^x, B^x and the consequent variation of the position of the discs A and B result in the angular positions of the said discs being changed, relatively to the casing Z^1 as shown in dotted lines in the plan view illustrated in Figure 18. The discs A and B as indicated in full lines in Figure 18 correspond with the position of the discs shown in Figure 16 whilst the dotted position of the discs in Figure 18 correspond to the position of the discs in Figure 17 and the variation in the horizontal distances between the disc centres is shown by X and X^1. It will therefore be understood that the effect of reducing the horizontal distance between the disc centres from X to X^1 is to increase the angle between the disc A and the casing Z^1 from V to V^1 see Figure 18. The constructions shown in Figures 13, 14 and 15 are as aforesaid generally similar to that illustrated in Figure 8 and show different ways in which the adjustment above described can be obtained. These examples also comprise means for adjusting the distance between the planes of the discs A and B this adjustment also enabling the two discs to be initially set at the most favourable angle relatively to the core or casing.

In the example shown in Figure 13 the spinning down disc A and the driving disc B are mounted on independent shafts A^x, B^x, the shaft A^x being on a stationary axis relatively to the supporting bracket or yoke C, whilst the shaft B^x is mounted in a rotatable eccentric bush E which is fitted in the yoke or swivelling frame C and has its axis of rotation in alignment with the axis of the shaft A^x. The shaft A^x which is fitted in a boss A^2 on the disc A is formed with a flange A^3 to which is secured an internally toothed ring A^1 and the driving disc B is formed with a toothed boss or pinion B^5 which is maintained in proper mesh with the internally toothed ring A^1 for all adjustments by reason of the axis of the bush E being in alignment with the axis of the shaft A^x. Therefore by angularly moving the bush E, (for which purpose it may be provided with a flange having tommy holes) the position of the driving disc B relatively to the spinning down disc is altered so as to vary the horizontal distance between the centres of the discs as hereinbefore described with reference to the diagrams in Figures 16, 17 and 18. A set screw E^1 in the yoke C is provided for clamping or locking the bush E in any position to which it is adjusted. The driving disc B with its toothed boss or pinion B^5 is mounted on ball bearings on a bush F fitted on the shaft B^x and internally threaded to engage with a threaded end of the said shaft B^x; the bush F has a flange with tommy holes F^1 for enabling it to be moved along the shaft B^x carrying with it the driving disc B and the pinion B^5, the teeth of the internally toothed ring A^1 being sufficiently wide to permit of this axial movement of the driving disc B and its pinion B^5 relatively to the spinning down disc A. The driving disc B may be locked in the desired position by means of a screw F^2 disposed in the bore of the shaft B^x and theaded in the end of the latter so that it can be screwed against the end of the bush F, as shown in Figure 13.

In the example shown in Figure 14 a one piece eccentric shaft is employed, one portion A^x of this shaft carrying the spinning down disc A whilst the portion B^x of the said eccentric shaft supports an externally threaded bush G on which the driving disc B is screwed and locked thereon by a lock nut G^1 provided with tommy holes. The pinion B^5 is keyed on a reduced end of the bush G so as to mesh with the internally toothed ring A^1 which in this example is secured a flanged boss on the spinning down disc A. The aforesaid eccentric shaft A^x, B^x is rotatably supported in the yoke or bearing C, the portion of the shaft fitted in said yoke preferably having its axis disposed equidistant between the axes of the pinion B^5 and the internally toothed ring A^1. The outer end of the eccentric shaft has keyed thereon a flange H which can be angularly moved to partially rotate the eccentric shaft A^x B^x in its bearing or yoke C

in order to vary the horizontal distance between the centres of the two discs A and B and thus enable the angle of the spinning down disc relatively to the casing to be changed as hereinbefore described with reference to Figures 16, 17 and 18. The flange H and the eccentric shaft may be locked in any desired position by means of screws H^1 engaging with the yoke or bearing C. The distance between the planes of the discs A and B can be altered by screwing the disc B to the desired position on the bush G without moving the pinion B^5.

In the example shown in Figure 15 the eccentric shaft having the portions A^x and B^x pertaining to the spinning down disc A and the driving disc B respectively, is rotatably mounted on a spindle K whose ends are supported in the bracket C which is suitably mounted to serve as the swivelling yoke described in the foregoing modifications. The outer end of the eccentric shaft has keyed thereon a flange H which can be adjusted to angularly move the eccentric shaft and vary the horizontal distance between the centres of the discs A and B as described in connection with the diagrams shown in Figures 16, 17 and 18. The flange H is adapted to be secured to suitable portions on the yoke or bracket C by set screws H^1 in order to set the eccentric shaft, the spinning down disc A and the driving disc B in the required positions. As in the example shown in Figure 14 the driving disc B is screwed on to an externally threaded bush G supported on the portion B^x of the eccentric shaft and provided with the pinion B^5 in mesh with the internally toothed ring A^1 carried on a flanged extension or boss of the spinning down disc A, so that the driving disc B can be moved to vary the distance between the planes of the two discs A and B as hereinbefore described. Instead of providing a spindle passing through the eccentric shaft as shown in Figure 15 the eccentric shaft may be formed with suitable ends fitting in bearings in the yoke or bracket C in such manner as to enable the eccentric shaft to be adjusted to vary the horizontal distance between the centres of the two discs A and B. As hereinbefore described, the adjustment of the eccentric shaft for varying the horizontal distance between the centres of the two discs A and B and changing the angularity of these discs relatively to the casing, results in the vertical distance Y (see Figures 16 and 17) being altered. In most cases this alteration in the vertical distance between the two centres would not be a disadvantage but if desired it may be avoided by suitably tilting the eccentric shaft so that the distance Y^1 (see Figure 17) can be reduced. This tilting movement may be effected by providing means for adjusting the support carrying the pin C^3, on which the forked arm C^2 carrying the yoke C is mounted; this adjustment may be effected by mounting the top portion of the reciprocating slide on a suitable hinge and providing means for clamping the same in any desired position so that the whole spinning down mechanism can be located as required. Various means for obtaining or effecting the change in the angularity of the discs relatively to the casing may be employed and the arrangements of the discs not employing a gear drive may also be made capable of adjustment to vary the horizontal distance between the centres of the discs and also to enable the distance between the planes of the discs to be varied as required so that the discs may be set in the most favourable angular or other positions relatively to the core to suit different types or sizes of casings to be built up.

After the discs A and B have been adjusted as required, the angularity thereof is controlled during the operative stroke by the core or casing serving as a cam and causing the yoke or frame C to partake of its swivelling movement so that the angular position of the discs changes as they move along the casing at the sides of the core.

Any suitable means for causing the air to impinge on the ply in advance of the spinning down disc may be provided in connection with any of the examples hereinbefore described, for instance, in some cases a separate pipe may be hinged on the axis of the swivelling yoke C around which axis, the two discs are angularly moved due to the contour of the core, the said pipe being bent round outside the spinning down disc with its nozzle suitably inclined to direct the air on to the loose portion of the ply in advance of the said disc.

Instead of employing a jet of air for preventing folding back or creasing of the plies a metal shield or wiper plate L (see Figures 19 and 20) may be mounted on the swivelling yoke or frame C in a position above the spinning down disc and preferably in the plane of the said disc, the inner end of the said plate being suitably curved to form a bearing surface which may engage with the ply on the rotating core prior to the spinning down disc making contact with the ply. Owing

to the wiper plate L being carried by the swivelling yoke or frame C it partakes of the angular movement which is imparted to the spinning down disc. Figure 20 shows a stop C^x on the swivelling yoke C which stop is adapted to come into contact with the forked arm C^2 when the spinning down disc A initially engages with the core, so as to prevent the yoke from moving too far towards the core prior to the driving disc B coming into contact with the core. After the spinning down disc has been slightly moved forward in commencing the operative stroke the driving disc B comes into contact with the core thus providing the "two point contact" which enable the swivelling yoke C and the two discs A and B to partake of the angular movement determined by the contour of the core or the casing thereon.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. Spinning down mechanism for case making machines in which means are provided whereby the surface or contour of the core supported in the machine (or the surface or contour of the casing plies on the core) directly controls the angularity of the spinning down discs during the inward or operative stroke or movement of the latter, substantially as and for the purpose specified.

2. Spinning down mechanism for case making machines in which the spinning down discs are supported in such manner as to be capable of a swivelling movement and are provided or associated with members in contact with the casing plies on the core so that the surface or contour of the core or the casing plies thereon serves as a cam for controlling the angularity of the spinning down discs during the operative stroke or movement of the same, substantially as and for the purpose specified.

3. Spinning down mechanism for case making machines in which each spinning down disc is associated with an additional disc the two discs being mounted on a swivelling member or frame and adapted to be maintained against the side of the core, substantially as and for the purpose specified.

4. Spinning down mechanism for case making machines in which each spinning down disc is connected to an additional disc in contact with the casing plies on the core and adapted to impart rotation to the spinning down disc, substantially as and for the purpose specified.

5. Spinning down mechanism for case making machines in which a driving disc is associated with each spinning down disc in such manner that the latter can be rotated at any required peripheral speed relatively to the peripheral speed of that portion of the casing ply with which the discs makes contact, substantially as and for the purpose specified.

6. Spinning down mechanism for case making machines in which each spinning down disc is rigidly connected or geared to a driving disc in such manner that the two discs have a fixed velocity ratio, substantially as and for the purpose specified.

7. Spinning down mechanism for case making machines in which each spinning down disc is frictionally connected to a driving disc, substantially as and for the purpose specified.

8. Spinning down mechanism for case making machines in which each spinning down disc is associated with a driving disc of smaller diameter than the spinning down disc, substantially as and for the purpose specified.

9. Spinning down mechanism for case making machines in which means are provided for adjusting the positions of the spinning down discs so that the said discs can be presented to the casing at the most desirable angle, which during the operative stroke of the disc is controlled by the surface or contour of the core, substantially as and for the purpose specified.

10. Spinning down mechanism for case making machines in which each spinning down disc is mounted in such manner relatively to a driving disc that the horizontal distance between the centres of the two discs can be varied, substantially as and for the purpose specified.

11. Spinning down mechanism for case making machines as set forth in Claim 10 in which the spinning down disc and the driving disc are mounted on eccentric shafts or the like so supported as to permit of the discs being adjusted to vary the horizontal distance between the centres of the two discs, substantially as and for the purpose specified.

12. Spinning down mechanism for case making machines in which each spinning down disc is provided with a driving disc, the said discs being capable of relative adjustment to vary the distance between the planes of the two discs substantially as and for the purpose specified.

13. Spinning down mechanism for case making machines comprising a spinning down disc associated with a driving disc,

means for supporting the two discs on a member or yoke which is mounted to swivel on an arm attached to a slide that imparts the desired radial movement to the two discs which are maintained by pressure means in contact with the sides of the core which serves as a cam for angularly moving the discs on the axis of the aforesaid swivelling member or yoke, substantially as and for the purpose specified.

14. Spinning down mechanism for case making machines in which each spinning down disc is associated with a driving disc which is held between friction plates on the shaft or spindle carrying the spinning down disc, the two discs being mounted on a swivelling frame, substantially as and for purpose specified.

15. Spinning down mechanism for case making machines in which each spinning down disc is provided with a toothed ring with which a pinion carried by a second or driving disc engages, the two discs being supported in a swivelling frame, substantially as and for the purpose specified.

16. Spinning down mechanism for case making machines as set forth in [illegible] of the preceding claims in which means [illegible] provided for causing a jet of air to impinge on the ply in advance of the [illegible]ning down disc, substantially as and for the purpose specified.

17. Spinning down mechanism for case making machines as set forth in any of the preceding claims, in which a shield or wiper plate is associated with each spinning down disc, substantially as described for the purpose specified.

18. Spinning down mechanism for case making machines having its parts constructed, arranged and adapted to operate substantially as hereinbefore described with reference to any of the examples illustrated in the accompanying drawings for the purpose specified.

Dated this 3rd day of November, 1921.

HASELTINE, LAKE & Co.,
28, Southampton Buildings, London, England, and
Park Row Building, 15, Park Row, New York, N.Y., U.S.A.,
Agents for the Applicants.

Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1922.

[This Drawing is a reproduction of the Original on a reduced scale]

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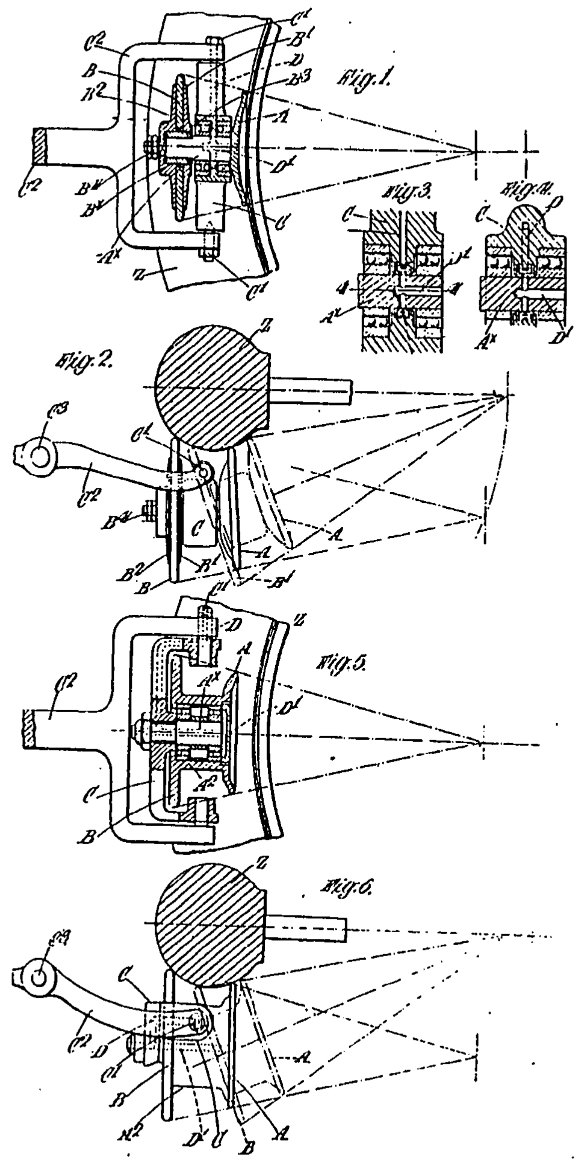

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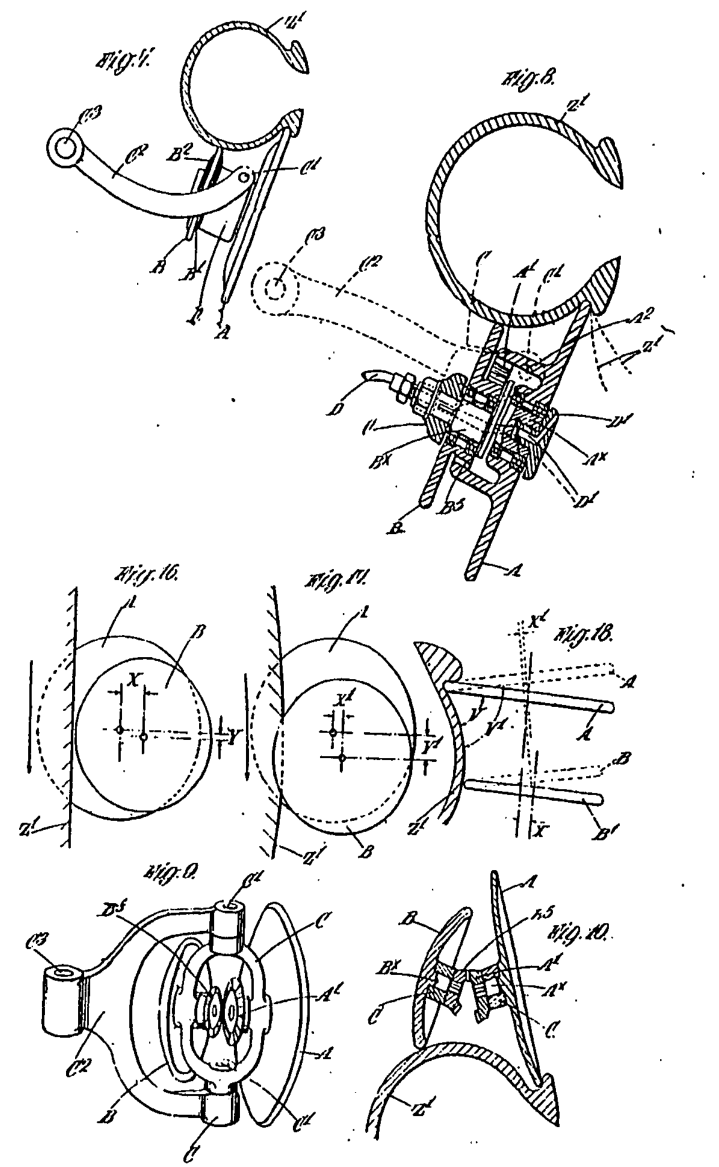

Malby & Sons, Photo-Litho

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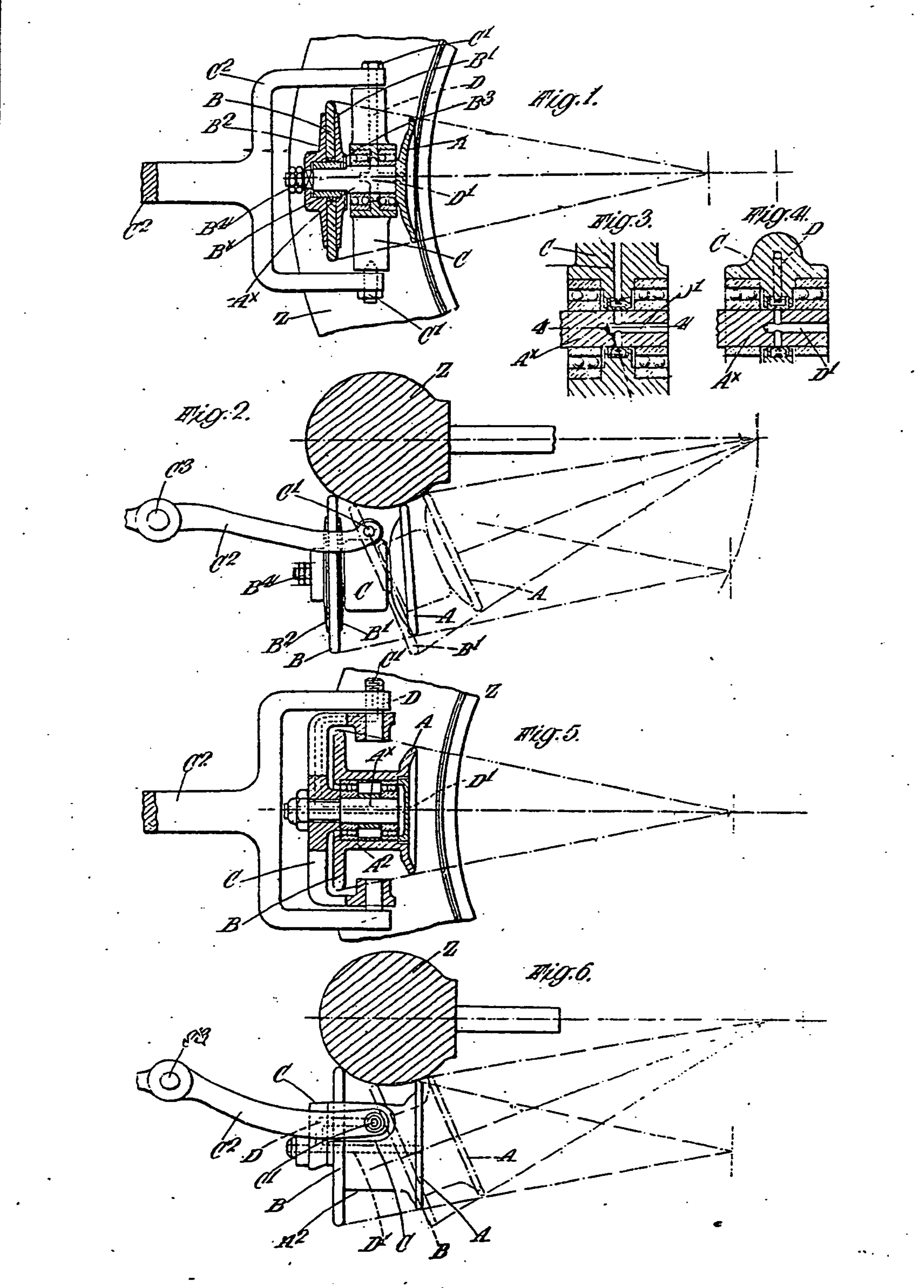

[This Drawing is a reproduction of the Original on a reduced scale]

4 SHEETS
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Fig. 7.

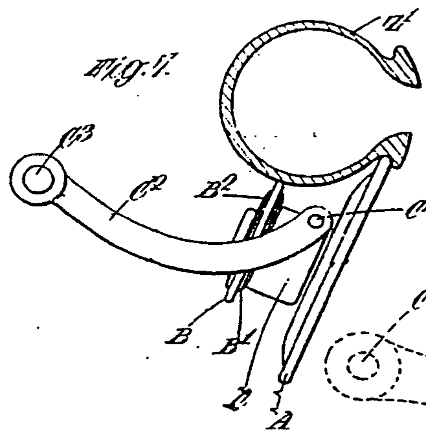


Fig. 8.

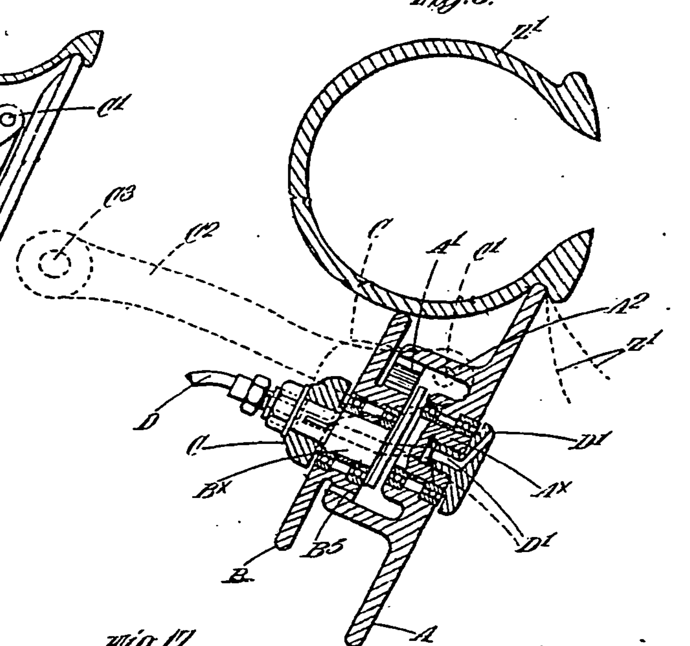


Fig. 16.

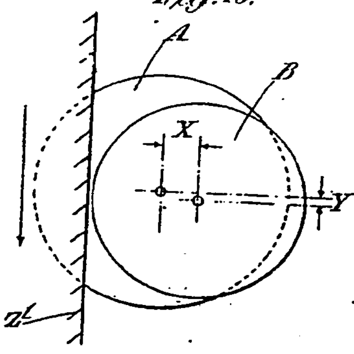


Fig. 17.

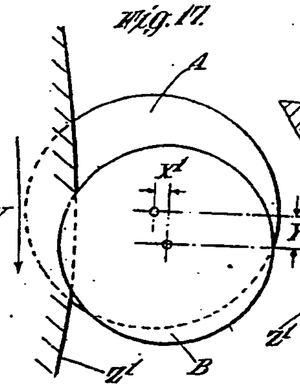


Fig. 18.

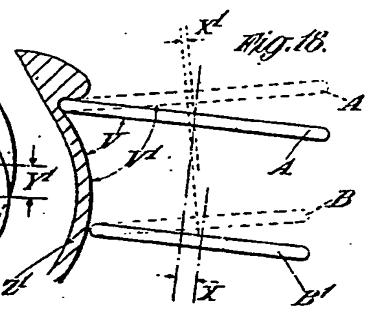


Fig. 9.

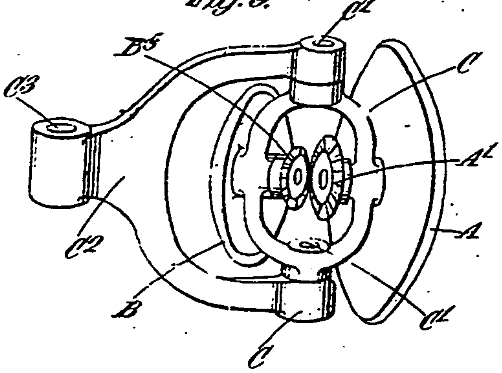
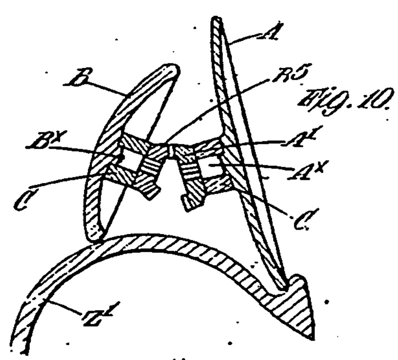


Fig. 10.



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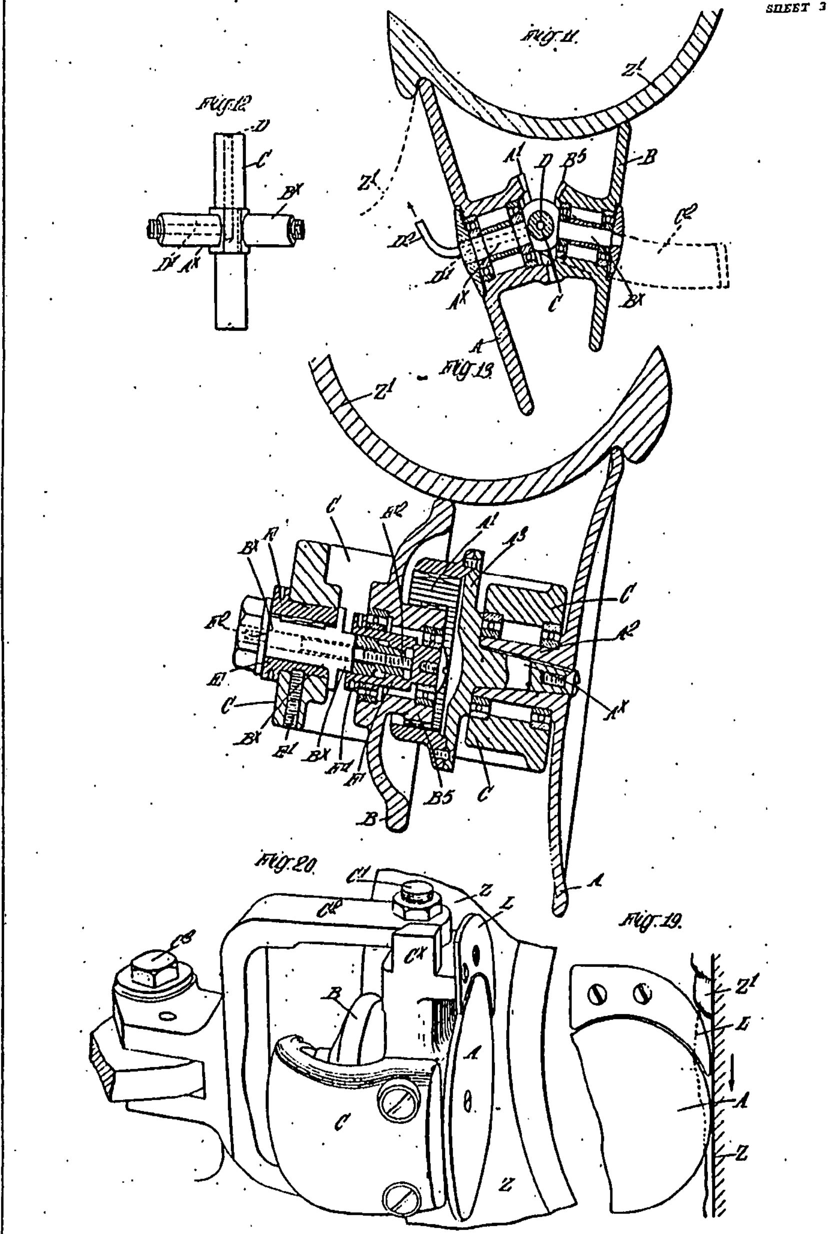

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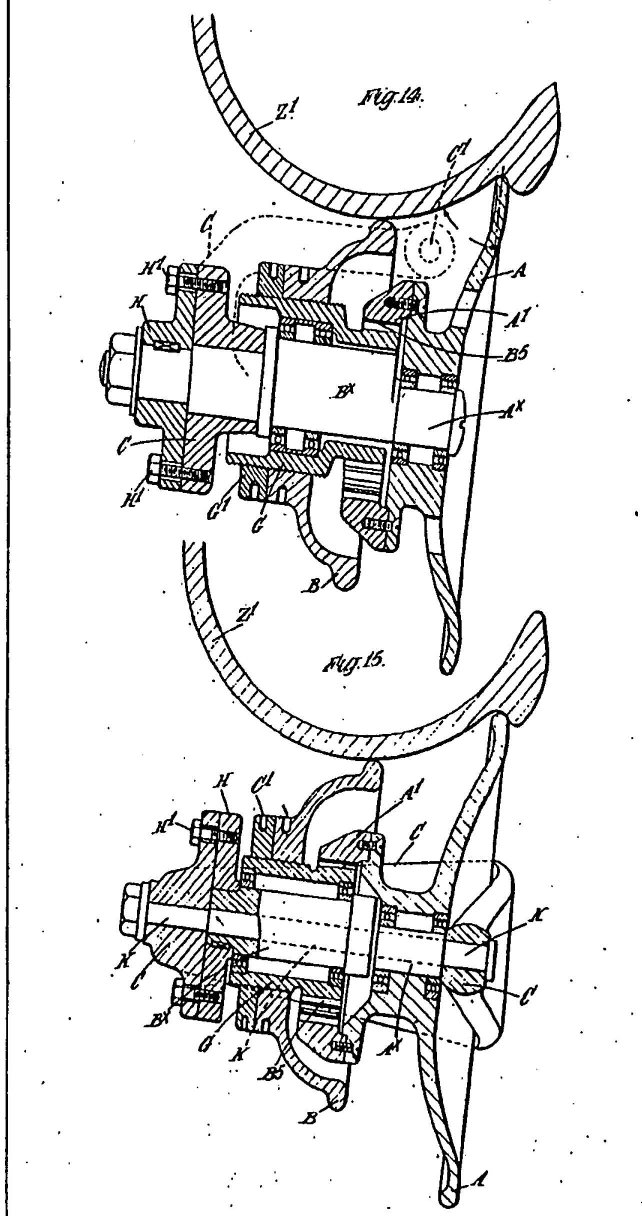

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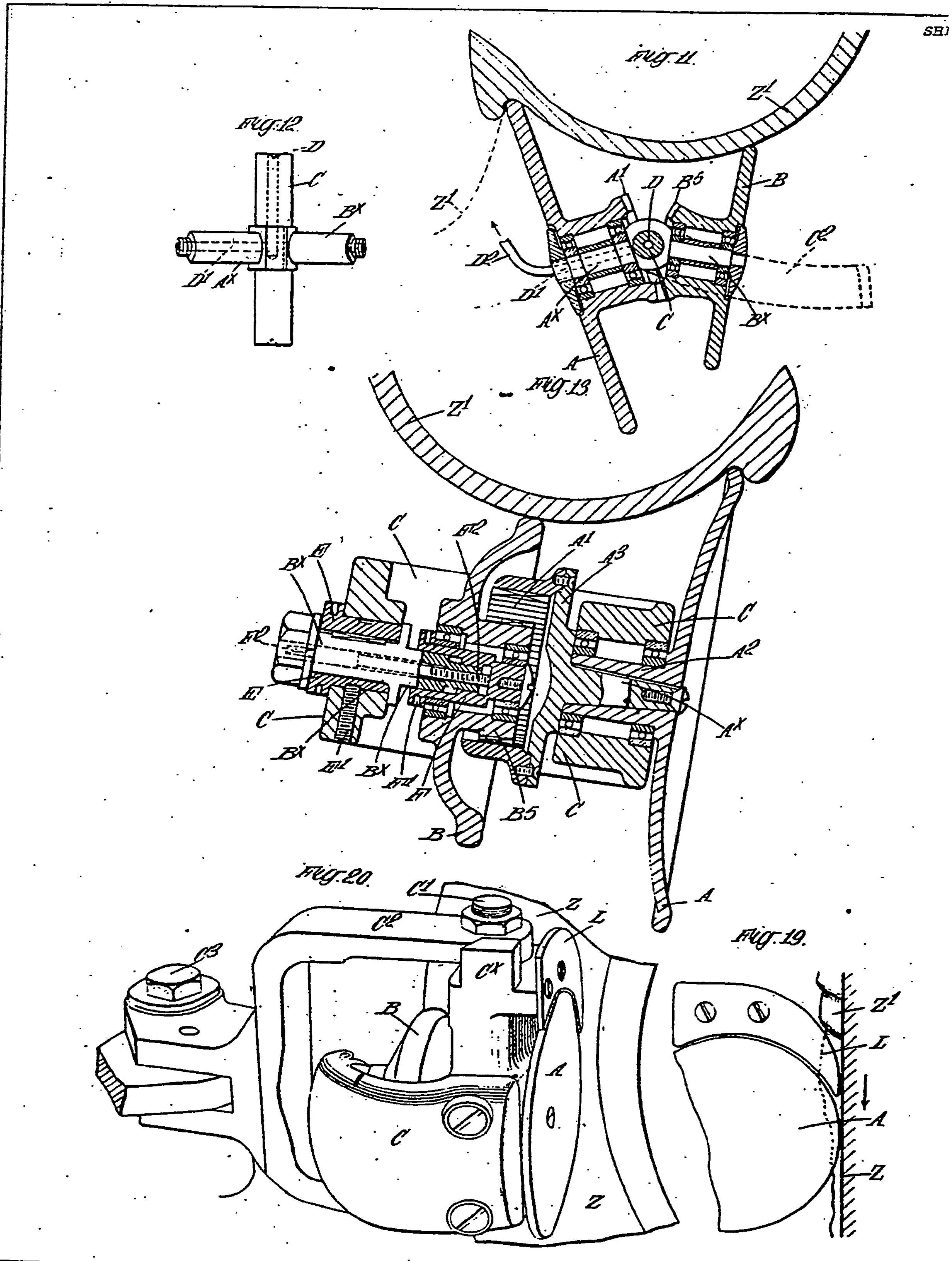

4 SHEETS

SHEET 3

SHEET 4

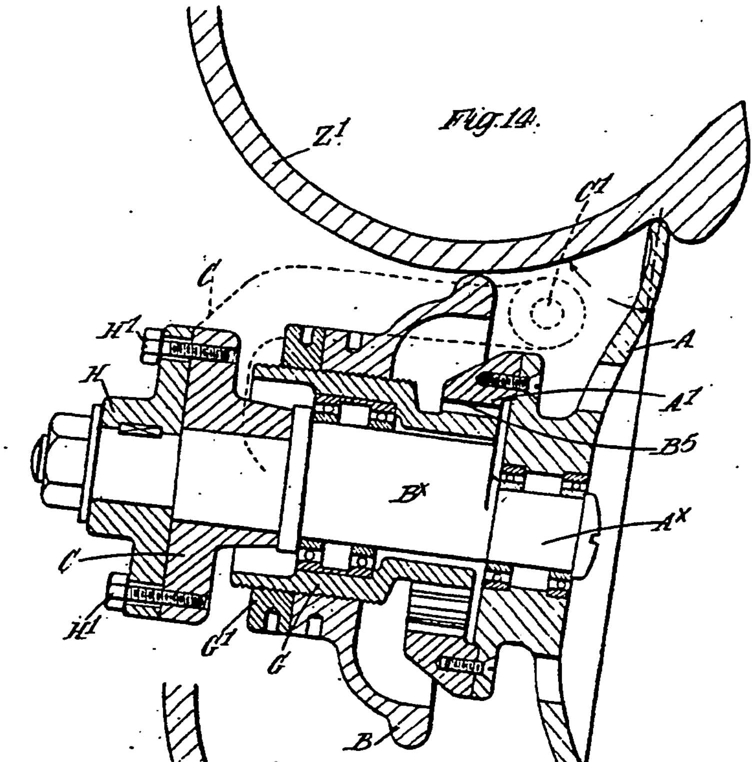

Fig.14.

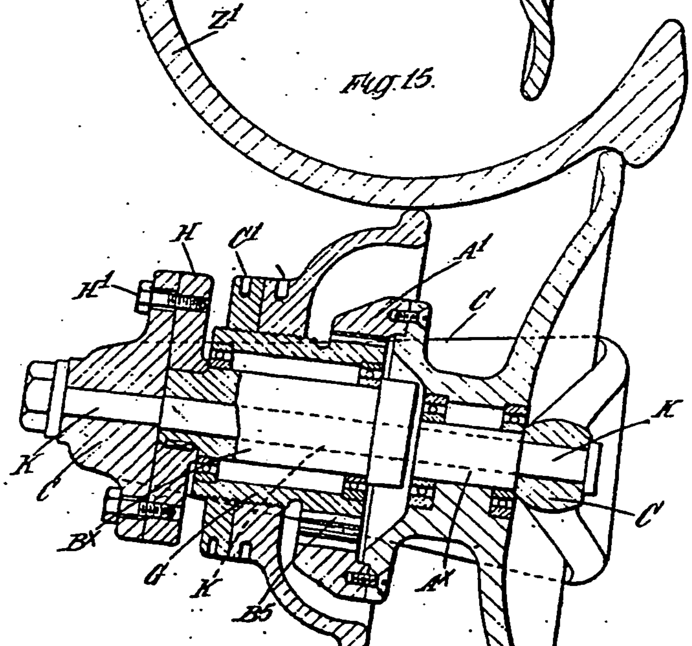

Fig.15.